

SIX FLAGS NEW ENGLAND	
SUBJECT: UNDERWATER DIVING	SAFETY REFERENCE MANUAL
SECTION: 34	
EFFECTIVE: January 2016	SUPERSEDES: ALL PREVIOUS
CFR #: 29 CFR 1910 Subpart T – Commercial Diving Operations	

34.1 OSHA SCOPE AND APPLICATION (29 CFR 1910.401)

(a) SCOPE:

(1) This subpart (standard) applies to every place of employment within the waters of the United States, or any state where diving and related support operations are performed.

(2) This standard applies to diving and related support operations conducted in connection with all types of work and employments, including general industry, construction, ship repairing, shipbuilding, shipbreaking and longshoring. **However, this standard does not apply to any diving operation:**

- (i) Performed solely for instructional purposes, using open-circuit, compressed-air SCUBA and conducted within the no-decompression limits;
 - (ii) Performed solely for search, rescue, or related public safety purposes by or under the control of a governmental agency; or
 - (iii) Governed by 45 CFR Part 46 (Protection of Human Subjects, U.S. Department of Health and Human Services) or equivalent rules or regulations established by another federal agency, which regulate research, development, or related purposes involving human subjects.
 - (iv) Defined as scientific diving and which is under the direction and control of a diving program containing at least the following elements:
 - (A) Diving safety manual which includes at a minimum; Procedures covering all diving operations specific to the program; procedures for emergency care, including recompression and evacuation; and criteria for diver training and certification.
 - (B) Diving control (safety) board, with the majority of its members being active divers, which shall at a minimum have the authority to: Approve and monitor diving projects; review and revise the diving safety manual; assure compliance with the manual; certify the depths to which a diver has been trained; take disciplinary action for unsafe practices; and, assure adherence to the buddy system (a diver is accompanied by and is in continuous contact with another diver in the water) for SCUBA diving.
- (b) Application in emergencies. An employer may deviate from the requirements of this standard to the extent necessary to prevent or minimize a situation which is likely to

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cause death, serious physical harm, or major environmental damage, provided that the employer:

- (1) Notifies the Area Director, Occupational Safety and Health Administration within 48 hours of the onset of the emergency situation indicating the nature of the emergency and extent of the deviation from the prescribed regulations;
- (2) Upon request from the Area Director, submits such information in writing.

(c) Employer obligation: The employers shall be responsible for compliance with:

- (1) all provisions of this standard of general applicability; and
- (2) all requirements pertaining to specific diving modes to the extent diving operations in such modes are conducted

34.2 APPLICATION TO SIX FLAGS NEW ENGLAND

Six Flags New England engages in some types of diving that fall under OSHA standards for commercial diving, and others that meet the “Scientific Aquarium Diving” standards developed by the American Academy of Underwater Scientists (AAUS). Scientific diving is exempted from OSHA commercial diving regulations under “Guidelines for scientific diving” - 1910SubpartTAppB. AAUS definition: “A scientific aquarium diver is a scientific diver who is diving solely within an aquarium. An aquarium is a shallow, confined body of water, which is operated by or under the control of an institution and is used for the purposes of specimen exhibit, education, husbandry, or research.

34.3 DIVING POLICY

1.1 PURPOSE

1.1.1 The Diving Safety Program

The purposes of a diving safety program are to insure that all diving under the auspices of Six Flags New England is conducted in a manner most likely to minimize accidental injury or occupational illness, and to set forth rules, regulations and standards for training.

1.1.2 The Diving Safety Manual

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The purpose of this Diving Safety Manual is to set forth the basic underwater diving safety policy, organization, regulations and procedures for safety in diving operations at Six Flags New England.

1.1.3 SCOPE

- A. Six Flags New England Auspices
- B. SCUBA diving under Six Flags New England auspices is limited to diving in connection with:
 - 1. Underwater Cleaning and Maintenance
 - 2. Research
 - 3. Checkout dives for new and/or returning employees

1.1.4 Certification Requirements

- A. Any person diving under Six Flags New England auspices is required to observe the provisions of this Manual. Diving is not permitted by individuals until they have met the requirements for diving pertinent to the level of the proposed activity.

1.1.5 Equipment

- A. All diving under Six Flags New England auspices shall be done with the proper equipment, as defined under Section 4 of this manual.

1.1.6 Diving Rules

- A. The regulations herein shall be observed at all locations, whether or not owned by Six Flags New England where diving is carried out under Six Flags New England auspices.

1.2 SAFETY DEPARTMENT

1.2.1 Authority

- A. The safety department has the authority to suspend any diving operations that are considered unsafe.
- B. A representative from the safety department shall meet with the Diving Control Board as an ex-officio member.

1.2.2 Responsibilities

- A. General surveillance over the health and safety aspects of the

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diving program.

- B. Access and audit of all diving program records pertaining to safety.

1.3 THE DIVING CONTROL BOARD

1.3.1 Composition

- A. The Diving Control Board is an administrative committee, appointed by the Director of each department that has diving requirements as part of their normal job function. The Diving Control Board shall be composed of experienced divers including the Six Flags New England Diving Officer. A representative of the Safety department will be an ex-officio member.

1.3.2 Authority

- A. The Diving Control Board shall have the authority to recommend the issue, reissue, or revocation of Six Flags New England diving privileges. It shall also have authority to suspend operations or programs that it considers unsafe or unwise.

1.3.3 Responsibilities

- A. The Diving Control Board has the responsibility to:
 1. Recommend changes in policy, and amendments to the Six Flags New England Diving Safety Manual as the need arises.
 2. Approve locations where diving may be conducted under Six Flags New England auspices.
 3. Approve new equipment or techniques for Six Flags New England.
 4. Establish and/or approve facilities for the inspection and maintenance of scuba equipment.
 5. Diving Control Board meeting shall convene a minimum of twice a year. However, any member of the Diving Control Board may schedule a meeting at any time.

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1.4 THE DIVING OFFICER

1.4.1 Appointment and Qualifications

- A. The Six Flags New England Diving Officer is appointed by the Diving Control Board, with confirmation by the General Manager, and shall be a Certified Diver. It is desirable that he/she has previous diving experience at Six Flags New England.

1.4.2 Authority

- A. The Six Flags New England Diving Officer shall have the authority to restrict or suspend any diving activity that is in his/her judgment unwise or unsafe. He/she shall inform the Diving Control Board immediately of any such restrictive actions. The Board may recommend that the restriction or suspension be overruled, but such a recommendation should require the approval by vote of a majority of the members of the Board.

1.4.3 The Diving Officer is responsible for the:

- A. Surveillance and coordination of all diving activities with special attention to safety and to assure the implementation of all applicable Six Flags New England policies and standards.
- B. Evaluation and surveillance of equipment and equipment maintenance programs, including arranging for or conducting tests of breathing and the approval and/or certification of all Six Flags New England sources of breathing gases.
- C. Approval of individuals/Department Representative qualified to perform check dives of new divers/employees.
- D. Preparation of recommendations for consideration by the Diving Control Board, such as changes in or additions to qualifying department representative for check out dives; standards and regulations to promote diving safety and efficiency; locations for Six Flags New England sponsored diving programs; new equipment; and individuals or organizations qualified to inspect equipment.
- E. Suspension of diving operations which he/she considers to be unsafe or unwise.

2 REQUIREMENTS

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2.1 ELIGIBILITY

2.1.1 Employment

- A. Only persons employed by or contracted by Six Flags New England are eligible to dive under Six Flags New England auspices.

2.1.2 Age Requirement

- A. The applicant for a diving related position shall be of age necessary to hold a valid diving certification card, and meet all age requirements for employment at Six Flags New England.

2.2 MEDICAL EVALUATION

2.2.1 Description

- A. Each applicant for a diving related position shall complete a physical examination in accordance with Chapter XVII, Occupational Safety and Health Administration 1910.411. A physician selected by Six Flags New England will perform the examination. Based on this medical evaluation, plus additional evaluation, if indicated, a statement as to whether or not the applicant is medically qualified to engage in scuba diving will be issued. A complete medical evaluation by Six Flags New England appointed physicians must be accomplished prior to commencement of scuba diving duties and at least annually as long as the person is registered and diving under Six Flags New England auspices. In the event of illness and/or hospitalization of twenty-four hours or more, return to diving activities will only be allowed with approval from the Health and Safety Department, and an appropriate physician if necessary.

2.2.2 Medical Prevention for Diving

- A. Any of the following conditions may be reason to prevent an employee from diving:
 1. Upper respiratory infection, i.e....colds, sinus infections, middle or inner ear infection
 2. Flu symptoms, i.e....fever, chills, body ache
 3. External ear infection
 4. Dental infection, i.e....abscess tooth
 5. Gastrointestinal infection, i.e....nausea, vomiting, diarrhea,

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- 6. abdominal pains, cramps
- 6. Pregnancy and/or menstrual cramps
- 7. Injury and/or illness requiring hospitalization more than 24 hours (must have approval from Health and Safety Department, and an appropriate physician if necessary)
- 8. Under the influence of prescription drugs, i.e....any narcotic or stimulant drug, any new medication or medication change prescribed diabetes (all new prescription drugs must be approved by Health and Safety Department prior to diving.)
- 9. Any new acute injury of illness or diagnosed chronic illness that requires splinting or prescription medicine.
- 10. Alcohol intoxication within the past 24 hours
- 11. Excessive fatigue
- 12. Emotional distress
- 13. Other illness or ailment as appropriately explained in writing by a Six Flags New England approved physician
- B. Any evidence of the above conditions should be discussed with the affected diver before making a final decision.

2.2.3 References

- A. References used for section 2.20 are from OSHA 1910.411

2.3 POOL SCUBA CHECK-OUT DIVE

2.3.1 Description

- A. Is the diver familiar with each component of SCUBA gear and its assembly, disassembly, preparation, adjustment, and donning
- B. Pre-dive safety drill/communication.
- C. Demonstrate ability to make a controlled, safe entry.
- D. Demonstrate ability to obtain and maintain neutral buoyancy.
- E. Demonstrate ability to make a controlled, safe descent.
- F. Demonstrate ability to remove and replace weight belt.
- G. Demonstrate ability to remove, recover, and clear regulator.
- H. Demonstrate ability to remove, replace and clear mask.
- I. Demonstrate ability to remove, and replace SCUBA unit.
- J. Demonstrate ability to make a controlled, safe ascent.
- K. Demonstrate knowledge of underwater signs and signals.
- L. Perform swim around pool of adequate duration to demonstrate the ability to coordinate all of the above skills at the same time.

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3 CERTIFICATION

3.1 TYPES AND LEVELS OF CERTIFICATION ACCEPTED

3.1.1 Eligibility

- A. Only persons holding valid SCUBA certification from a recognized, reputable certifying organization will be eligible for diving activities at Six Flags New England. ex. NAUI, PADI, SSI, etc.) The level of certification required must be at least equivalent to that of Basic SCUBA Diver, SCUBA Diver, Open Water SCUBA Diver, or other entry level certification depending on the certifying organization.

3.1.2 Approval

- A. Approval to commence diving activities at Six Flags New England will be given after successful completion of the check-out skills as detailed in section 2.51.

3.2 ADDITIONAL CRITERIA

3.2.1 Documentation

- A. At the conclusion of the check out period, the following documents recording the successful completion of the requirements must be submitted:
 1. Medical Evaluation Form (see Section 2.20)
 2. Pool SCUBA Checkout Dive Form (see Section 2.50)
 3. Valid SCUBA certification card
- B. Submission of these documents and successful completion of check out dives will result in approval to dive in park.

3.2.2 Job Specific Training

- A. Theoretical aspects should include principals and activities appropriate to the intended area of each department. Suggested topics include, but are not limited to, animal observation, animal husbandry, system repair and maintenance, and pool cleaning/maintenance.

3.2.3 CPR Certification

- A. The trainee must provide proof of current certification in

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cardiopulmonary resuscitation (CPR). Health and Safety Department will provide CPR training as required.

3.2.4 Water Rescue

- A. New Employees will be introduced to water rescue training followed by formal training by Health and Safety Department as needed.

3.3 MAINTENANCE OF ELIGIBILITY

3.3.1 Term of Eligibility

- A. All diving privileges shall expire one year from the date of the last medical examination, or six months from the date of the last logged dive.

3.3.2 Annual Medical Examination

- A. All certified divers shall pass an annual medical examination provided by Six Flags New England After each major illness or injury, a certified diver must submit an authorization from a physician to return to diving activities.

3.4 REVOCATION OF DIVING PRIVILAGES

- 3.4.1 A Diver's privileges may be revoked or restricted for cause. Violation of any of these Six Flags New England diving regulations may be considered cause. The diver shall be informed in writing by the Diving Officer of the reasons for revocation, and he/she will be given an opportunity to present his/her case to the Board in writing for reconsideration and/or requalification. All such written statements and requests as identified in this section are formal documents which will become part of the employees file.

4 DIVING EQUIPMENT

4.1 GENERAL POLICY

- 4.1.1 Each department will provide the minimum scuba equipment as listed in 4.22 to their divers. Before any personal equipment is used it must be inspected and approved by the Six Flags New England Diving Control

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Board and/ or representative.

- 4.1.2 All equipment shall meet standards as determined by the Diving Control Board. Equipment that is subjected to extreme usage under adverse conditions should require more frequent testing and maintenance. Due to various safety concerns, lead shot weight will not be permitted.

4.2 RECORD KEEPING

4.2.1 Description

- A. Each department will be required to maintain their equipment in proper working order and ensure valid and current inspections. Each equipment modification, repair, test, calibration or maintenance service shall be recorded and kept on file in a location designated by the Six Flags New England Diving Control Board or Dive Committee. Records should include the date and nature of the work performed for the following equipment listed in 4.22 and 4.23.

4.2.2 Diving Equipment

- A. Regulators
- B. Submersible pressure gauges
- C. Depth gauges
- D. Scuba cylinders
- E. Cylinder valves
- F. Diving helmets
- G. Submersible breathing masks
- H. Buoyancy control device or floatation device
- I. Communications Equipment

4.2.3 Compressor Equipment

- A. Compressors
- B. Air control panels
- C. Air Storage cylinders
- D. Air filtration systems (modified)
- E. Analytical testing equipment
- F. Cascade system

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4.3 SCUBA REGULATORS AND GAUGES

4.3.1 Approval

- A. Only those makes and models of regulators and gauges specifically approved by the Diving Control Board shall be used. All regulators shall have a submersible pressure gauge installed and functional. Regulators suspected of not functioning in a normal manner shall be immediately inspected and repaired by an authorized repair facility.

4.3.2 Inspection and Maintenance

- A. All scuba regulators and gauges procured by Six Flags New England shall be inspected and tested before use and at 12 month intervals thereafter by a technician approved by the Diving Control Board. A record of inspections and overhauls shall be maintained by the Six Flags New England department dive representatives.

4.4 SCUBA CYLINDERS

4.4.1 Type

- A. Scuba cylinders shall be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.

4.4.2 Hydrostatic Test

- A. Scuba cylinders must be hydrostatically tested in accordance with DOT standards.

4.4.3 Internal Inspection

- A. Scuba cylinders must have an internal visual inspection at intervals not to exceed twelve months. Any tank that has been emptied and out of service for an extended period of time must be internally visually inspected before being returned to service. Extended period of time for Six Flags New England is defined as anything greater than two days. Every attempt should be made to refill tanks immediately after a dive is completed.

4.4.4 Valves

- A. Scuba cylinder valves shall be functionally tested at intervals not to

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exceed 12 months.

4.4.5 Manual Air Reserves

- A. Manually operated reserves such as “J” valves are not permitted.

4.5 AUXILIARY EQUIPMENT

4.5.1 Approval

- A. All auxiliary equipment shall be of a type approved by the DCB.

4.5.2 Inspection

- A. Backpacks, weight systems, and other auxiliary equipment shall be regularly examined by the person using them.

4.5.3 Quick Release Devices

- A. All weight systems and scuba backpacks or BCDs worn by the diver shall be equipped with quick release devices designed to permit jettisoning the entire gear. The quick release device must operate easily with either hand.

4.5.4 Communications Equipment

- A. Surface-use communications equipment such as a telephone or two-way radios must be at the dive location in order for the stand by diver or divers to communicate with Security in the event of an emergency.

4.5.5 Hand-held Underwater Power Tools

- A. Electrical tools and equipment used underwater shall be specifically approved by the manufacturer and the Diving Control Board for this purpose. Electrical tools and equipment supplied with power from the surface shall be de-energized before being placed into or retrieved from the water. Hand-held power tools shall not be supplied with power from the dive location until requested by the diver.

4.6 BREATHING MASKS AND HELMETS

4.6.1 Breathing masks and helmets shall have:

- A. A non-return valve at the attachment point between helmet or mask hose, which shall close readily and positively.

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- B. An exhaust valve.
- C. A minimum ventilation rate capable of maintaining the diver at the depth to which he/she is diving.

4.7 BREATHING AIR STANDARDS

4.7.1 Specifications

- A. Breathing air for scuba use shall meet the specifications established for Compressed Gas Association (CGA) Grade E air. This is consistent with the standards applied to sport and scientific (AAUS) diving.

4.7.2 Analysis

- A. Breathing air shall be analyzed at a minimum of 6-month intervals, and by an approved testing facility.

4.8 COMPRESSOR SYSTEMS

4.8.1 Design and Location of Compressor

- A. Low pressure compressors used to supply air to the diver shall be equipped with a volume tack with a check valve on the inlet side, a pressure gauge, a relief valve and a drain valve.
- B. Compressed air systems over 500psi shall have slow-opening shutoff valves.
- C. All air compressor intakes shall be located away from areas containing exhaust or other contaminants.

4.8.2 Compressor /Cascade Operation And Air Test Records

- A. Gas analyses and air tests shall be performed at regular intervals of no more than 100 hours of operation or six months, whichever occurs first. The results of these tests shall be entered in a formal log and be maintained at the dive locker.
- B. A log shall be maintained showing each operation, repair, overhaul, filter maintenance, and temperature adjustment for each compressor.
- C. Authorized personnel will attend the compressor /cascade system during operation.
- D. Only trained and authorized personnel will charge air cylinders following established standard operating procedures.

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4.8.3 Certification and Testing of Commercial Sources

- A. Breathing air from commercial sources approved by the Diving Control Board shall be certified on a regular basis as suitable for breathing, according to specifications in Section 4.70.
- B. The results of tests of breathing air from commercial sources shall be recorded and filed with the Safety Office.

4.9 OXYGEN SAFETY

- 4.9.1 In the event of oxygen use the Board will decide the extent of the safety involvement.
- 4.9.2 Should only be used by qualified health care professionals. No mixed gas diving will be used at Six Flags New England.

5 DIVING REGULATIONS

5.1 CERTIFICATION REQUIRED

5.1.1 Requirements

- A. No person shall engage in diving operations under Six Flags New England auspices unless he/she holds a valid diving certificate of at least entry level classification issued by a recognized, reputable certifying organization. (see Section 3.00)
- B. Diving shall not be conducted unless procedures have been established for emergency evacuation of the diver(s) to the nearest emergency care facility (follow normal park medical emergency procedures). The emergency care facility will stabilize the patient and transport as necessary to the nearest hyperbaric chamber or appropriate medical facility.

5.1.2 Depth Limitations

- A. A diver shall not exceed the capabilities or limitations of his/her certification. No diver shall work at depths that are inappropriate or inconsistent with his/her level of certification and experience.
- B. For the purposes of Six Flags New England there are no depth limitations within the park proper. If diving outside of the park is required this must be approved by the DCB.

5.2 DIVING PRECEDURES

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5.2.1 Buddy System

- A. All diving shall be conducted in one of two manners, with the buddy system or the use of a stand-by diver.
- B. The term Buddy System as defined under Six Flags New England diving rules and regulations states.
 1. Diving shall be conducted in buddy pairs, unless the task being undertaken dictates the use of a third diver.
 2. Divers shall maintain close and continuous contact and be in a position to render assistance in case of need.
 3. If buddy separation occurs, all divers shall surface immediately and remain there until contact is reestablished visually.
 4. The buddy system is based upon mutual assistance, especially in case of emergency. Dives should be planned around the competency of the least experienced diver.
 5. Solo Dives is prohibited except where covered by rules that apply to tended or standby divers (below).
 6. During multiple cylinder dives and when diving in buddy pairs a diver exiting the water becomes the stand-by diver until if and when he re-enters the water.
- C. Under AAUS “Scientific Aquarium Diving” standards: “A diver and tender may comprise a buddy team in the confined environment of an aquarium only when the maximum depth does not exceed 30 feet, and there are no overhead obstructions or entanglement hazards for the diver, and the tender is equipped, ready and able to conduct or direct a prompt and effective in-water retrieval of the diver at all times during the dive.” (See Stand-by diver).

5.2.2 Stand-by Diver

- A. All diving shall be conducted in one of two manners, either the buddy system or the use of a stand by diver. The term stand by diver as defined by Six Flags New England Diving rules and regulations states:
 1. When the situation dictates the use of a stand-by diver will be required. Such situations include confined or enclosed

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areas, bounce diving and inspection diving.

2. The stand-by diver must be in constant communication either by visual, auditory (i.e. underwater communication system), or physical (i.e. tethered) means with the diver in the water.
3. The stand-by diver must be ready at a moment's notice to enter the water to attempt a rescue. The appropriate equipment must be in the immediate area and readily accessible.
4. The stand-by diver must have communication with Security either by telephone or 2-way radio.

5.2.3 Surfacing

- A. Divers must begin to surface when the air cylinder pressure reaches a minimum of 500 psi.

5.2.4 Diver's Flag

- A. The diver's flag shall be prominently displayed whenever diving is conducted under circumstances in which boat traffic is a possibility or whenever required.

5.2.5 Buoyancy Device

- A. All divers shall wear on every dive, personal floatation equipment, which has been approved by the Board, and is appropriate to the task being undertaken and the environment.

5.2.6 Timing Device and Depth and Pressure Gauges

- A. When engaged in open water diving, both members of the diving pair must have an underwater time keeping device and an approved depth indicator. This also applies when any possibility exists of exceeding no-decompression limits in an artificial environment.
- B. For AAUS-sanctioned "Scientific Aquarium Diving" (diving in animal displays):
 1. A depth indicator is not required, except that a repetitive diver shall use the same dive computer used on any prior dive (when a dive computer may be required).

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2. Only one buddy must be equipped with a timing device.
3. The maximum obtainable depth of the aquarium shall be used as the diving depth.

- C. All divers will use regulators equipped with a submersible tank pressure gauge.

5.2.7 Dive Tables

- A. Current U.S. Navy Diving Tables and Procedures shall be followed during all diving operations unless an alternate procedure or device is authorized by the Board. Any alternate decompression table or device shall be at least as safe as the U.S. Navy Diving Tables. A set of appropriate diving tables must be available at the dive location, except where shallow aquariums render it physically impossible to exceed no-decompression limits.

5.2.8 Depth Limits

- A. No diver shall exceed the limits of his or her certified training. Six Flags New England diving is generally no deeper than 30 feet.
 1. A certified diver shall not exceed his/her depth limitations as dictated by the level of certification possessed unless accompanied by a diver certified to a greater level of training.

5.2.9 Refusal to Dive

- A. The decision to dive is that of the diver. A diver may choose not to dive whenever he/she feels it is unsafe for them to make the dive.
- B. Safety- The ultimate responsibility for safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive if, in his/her judgment, conditions are unsafe or unfavorable, or if he/she would be violating the precepts of his/her training or the regulations in this guide, or health reasons as stipulated in Section 2.23.
- C. Unfavorable conditions may include, but are not limited to

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conditions such as adverse or extremely cold weather. For the purposes of Six Flags New England extremely cold weather is defined as conditions that are cold enough, with or without a wind chill factor, to threaten the diver's health or damage external body tissues.

- D. The refusal to dive due to any condition must be discussed with the department supervisor or the DCB representative.

5.2.10 Termination of the Dive

- A. It is the responsibility of the diver to terminate the dive, whenever he/she feels it is unsafe to continue diving. The diver must inform his/her dive buddy of his/her intentions.
- B. The dive shall be terminated while there is still sufficient tank pressure to permit the diver to safely reach the surface, including decompression time, or to safely reach an additional air source at the decompression station.
- C. The divers shall begin to surface when the air cylinder pressure reaches a minimum of 500 psi.

5.3 SPECIALIZED DIVING TECHNIQUES (If Used)

5.3.1 Description

- A. Diving Certification does not entitle a diver to exceed his/her level of training. It is necessary in some instances to request further training and permission from the board before undertaking a more complicated project that requires more specialized equipment or diving procedures. Under no circumstances is a diver to undertake a project utilizing equipment or procedures found in this section (5.32-5.37) without prior training and approval from the Board.

5.3.2 Closed and semi-closed circuit scuba (rebreathers) shall meet the following requirements:

- A. Oxygen partial pressure in the breathing gas shall not exceed values by the Dive Control Board. The generally accepted

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maximum value is 1.5 atmospheres ppO₂ at depths greater than 25 fsw (7.6 msw)

- B. Chemicals used for the absorption of carbon dioxide shall be kept in a cool, dry location in a sealed container until required for use.
- C. The designated person-in-charge shall determine the carbon dioxide absorption canister is used in accordance with the manufacturer's instructions.
- D. Closed and semi-closed diving equipment will not be used at a depth greater than that recommended by the manufacturer of the equipment.

5.3.3 Surface Supplied Diving using Hookah (surface-mounted compressor)

- A. Hookah divers shall comply with all scuba diving procedures in this manual:
 - 1. Divers using the hookah mode shall be equipped with a diver-carried independent reserve breathing gas supply.
 - 2. Each hookah dive shall be hose-tended by a separate dive team member while in the water.
 - 3. The hookah breathing gas supply shall be sufficient to support all hookah divers in the water for the duration of the planned dive, including decompression.

5.3.4 Surface Supplied Diving using surface-mounted scuba cylinders supplied with long regulator hoses.

- A. In general (exemptions below) surface supplied divers shall comply with all scuba diving procedures in this manual. Surface diving shall not be conducted at depths greater than 190 fsw (58msw).
 - 1. Divers using the surface supplied mode shall be equipped with a diver-carried independent reserve breathing gas supply.
 - 2. Each surface supplied diver shall be hose tended by a

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- separate dive team member while in the water.
 3. Divers using the surface supplied mode shall be maintaining voice, and/or visual communication with the surface tender.
 4. The surface supplied breathing gas supply shall be sufficient to support all surface supplied divers in the water for the duration of the planned dive, including decompression.
 5. During surface supplied diving operations when one diver is in the water, there must be a standby diver in attendance at the dive location.
 - B. Where diving operations are limited to animal display tanks, AAUS Scientific Aquarium Diving exemptions shall apply. This is appropriate as OSHA regulations permit certain exemptions for the purposes of scientific diving. AAUS standards for shallow, artificial, controlled environments are somewhat less restrictive than their general scientific diving standards (which also apply to operations in natural environments).
 1. Surface-supplied Scientific Aquarium Divers using conventional scuba masks, full-face masks, or non-lockdown type helmets are exempt from the requirement to carry an independent reserve breathing gas supplies provided:
 - a) There are no overhead obstructions or entanglements, and
 - b) The diver is proficient in performing a controlled emergency swimming ascent from at least as deep as the maximum depth of the aquarium, and
 - c) The diver is proficient in performing out of air emergency drills, including ascent and mask/helmet removal.
 2. Scientific Aquarium Divers are exempt from the requirement for a stand-by diver, provided the tender is equipped, ready, and able to conduct a prompt and effective in-water retrieval of the diver at all times during the dive.

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C. Diving in shallow pools (7 ft deep or less).

The AAUS Scientific Aquarium Diving standards also state: “It is recognized that within Scientific Aquarium Diving there are environments and equipment that fall outside the scope of those addressed in this manual. In those circumstances it is the responsibility of the organizational member’s Dive Control Board to establish the requirements and protocol under which diving will safely be conducted.” The maintenance of shallow exhibits is one such special case.

Six Flags New England divers working in pools seven feet deep or less are not exposed to the same risks as those diving deeper pools when their air supply is interrupted. The following standards are applicable when the divers are using standard (half-face) scuba masks.

1. It is often possible to just stand up in shallow exhibits (such as C-1 and NPC at the aquarium building). If two divers are working on such an exhibit, no tenders are required and the divers act as a buddy pair. A tender or spotter is required when diving alone.
2. If the exhibit is slightly deeper than the diver’s height, but he/she can use handholds to pull his/her head above water, the above guidelines also apply. The Tropical, Freshwater, and Fishes of Southern California displays at the aquarium building fit this description.

5.3.5 Saturation Diving

- A. Saturation Diving is not permitted at Six Flags New England

5.3.6 Night Diving

- A. Many dives are day dives but lights are required due to their locations, i.e., enclosed tanks such as ozone contact chambers. The following rules apply to any person on the Six Flags New England Diving Program required to participate in night diving, or diving in areas where ambient light is reduced or not available.

1. Only lights specifically designed and approved for underwater use shall be used.

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2. Underwater communications equipment must be used in enclosed tanks when light availability or tank structure make visual communication between stand-by diver and diver difficult or impossible.

5.3.7 Boat/Platform Diving or Observation Boat

- A. Boat/Platform driver must be certified and trained in the operation of Six Flags New England boats by the proper personnel when any type of diving is involved.
- B. Observation boat shall lay off at a safe distance when observing during operation preferably several lengths of the craft until signaled by the driver to approach.
- C. Boat/Platform driver must always keep the safety of the diver in mind.

5.3.8 Dive Computers

- A. Only those makes and models of dive computers specifically approved by the Diving Control Board may be used.
- B. Any diver desiring to use dive computers must have equipment approved by DBC and demonstrate understanding and proficiency in its used.
- C. After the Diving Control Board has approved the diver, he/she must agree to follow all policies and procedures that the Diving Control Board establishes in the future, as more information regarding the use of dive computers becomes available.
- D. Training for the operation and maintenance of dive computers must be provided by the equipment manufacturer and documented on a training log sheet.
- E. The diver shall not rely solely on the dive computer for all his/her information.

5.4 DIVING OPERATIONS

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5.4.1 Lead Diver

- A. For each dive one individual shall be designated as the lead diver. He/she shall be at the dive location during the diving operation. The lead diver shall be responsible for:
 1. Coordination. Diving shall be coordinated with other known activities in the vicinity, which are likely to interfere with diving operations.
 2. Briefing. The dive team members shall be briefed on:
 - a) Dive objectives
 - b) Unusual hazards or environmental conditions likely to affect the safety of the diving operation.
 - c) Modifications to diving or emergency procedures necessitated by the specific diving operation.
 - d) Reporting any physical problems or adverse physiological effects including symptoms of pressure related injuries.
 3. Dive planning. Planning of a diving operation shall include considerations of the safety and health aspects of the following:
 - a) Diving mode.
 - b) Surface and underwater conditions and hazards.
 - c) Breathing gas supply.
 - d) Thermal protection.
 - e) Diving Equipment.
 - f) Dive team assignments.
 - g) Residual inert gas status of dive team members.
 - h) Decompression schedules and altitude corrections.
 - i) Emergency procedures.
 4. Regular (Routine) dives should each have a written S.O.P. to direct the Dive team. S.O.P's should include equipment necessary, personnel required, and an outline of the accepted procedure to complete the task.

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5.4.2 Dive Plans

- A. Before conducting any diving operations under the auspices of Six Flags New England the lead diver for a proposed operation should consider the following information:
1. Other diver's qualifications and the type of certification held by each diver.
 2. Numbers to call in case of emergency- 3333.
 3. Approximate number of proposed dives.
 4. Location of proposed dives.
 5. Estimated depth and bottom time anticipated.
 6. Repetitive dives, if required.
 7. Any hazardous conditions anticipated.

5.4.3 Pre-dive Safety Checks

- A. Diver's Responsibility:
1. Each diver shall conduct a functional check of his/her diving equipment in the presence of the diving buddy or tender.
 2. It is the diver's responsibility and duty to refuse to dive if, in his/her judgment, conditions are favorable, or if he/she would be violating the precepts of his/her training or of this manual.
 3. No dive team member shall be required to be exposed to hyperbaric conditions against his/her will, except when necessary to prevent or treat a pressure-related injury.
 4. No dive team member shall be permitted to dive for the duration of any known condition that is likely to adversely affect the safety and health of the diver or other dive members.
 5. The diver shall terminate the dive when there is a minimum of 500 psi tank pressure. This is to permit the diver to safely reach the surface or an additional air source if

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needed for decompression.

B. Equipment Evaluations:

1. Each diver should perform a check of the submersible pressure gauge, timing device as required, and depth gauge.
2. Each diver shall have the capability of achieving and maintaining positive buoyancy.

C. Diver's Qualifications:

1. Each diver shall be currently certified, trained, and qualified for the diving mode being used, and each dive team member shall have experience or training in the following:
 - a) The use of the instruments and equipment appropriate to the diving activity to be conducted.
 - b) Dive planning and emergency procedures.
 - c) Current certification in cardiopulmonary resuscitation.
 - d) Diver-related techniques (Cold Water Rescue) and diving-related first aid.
 - e) Diving-related physics and physiology, recognition of pressure-related injuries, and the appropriate emergency procedure.

5.4.4 Post-dive Safety Checks

- A. After the completion of a dive, each diver shall report any physical problems, symptoms of decompression sickness, or equipment malfunctions immediately.
- B. When diving outside the no-decompression limits, the divers should remain awake for at least one hour after diving, and in the company of a dive team member who is prepared to transport him/her to a hyperbaric chamber if necessary.

5.4.5 Emergencies and Deviations from Regulations

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- A. Any diver may deviate from the requirements of this manual to the extent necessary to prevent or minimize a situation that is likely to cause death, serious physical harm, or major environmental damage. A written report of such actions must be submitted to the DCB explaining the circumstances and justifications.

5.4.6 Consequences of Violations of Regulations

- A. Violations of the safety regulations and stated procedures in this manual will lead to disciplinary action up to and including termination of employment.

5.5 RECORDKEEPING AND REQUIREMENTS

5.5.1 Personal Diving Log

- A. Each certified diver shall log every dive made under the auspices of Six Flags New England and is required to log all other dives. Standard forms will be provided to each diver. Log sheets shall be placed in the diver's permanent file. The diving log shall be in a form specified by the DCB and shall include at least the following:
 - 1. Name of diver and partner/standby diver
 - 2. Date, time, and location.
 - 3. Maximum depths, bottom time, surface interval time, and special conditions if necessary.
 - 4. A detailed report prepared by the diver of any potentially dangerous situation to be submitted to the Dive Control Board.
- B. If pressure-related injuries are suspected or if symptoms are evident, the following additional information shall be recorded and retained by Six Flags New England Health and Safety Department.
 - 1. Complete accident report.
 - 2. Description of symptoms, including depth and time of onset.
 - 3. Description and results of treatment.
- C. The Diving Control Board shall investigate and document any

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incident of pressure-related injury and prepare a report which is to be forwarded to Risk Management.

5.5.2 Record Maintenance

- A. The diving officer or department designee shall insure permanent records are maintained for each individual certified diver. The file shall include evidence of certifications, log sheets, recorded date of last physical to determine dive eligibility, waiver, reports of disciplinary actions by the DCB, and the other pertinent information deemed necessary.
 1. Availability of Records
 - a) Medical records shall be available to the attending physician of a diver or former diver when releases in writing by the diver.
 2. Records and documents required by this standard shall be retained by the member organization for the following records.
 - a) Manual for diving safety- current document only.
 - b) Records of dive- minimum 5 years
 - c) Equipment inspection logs and testing records- until equipment is withdrawn from service.

5.5.3 Required Accident Reporting

- A. All diving accidents requiring recompression or resulting in serious injury shall be reported to Health and Safety Department and diving officers. The standard procedures for accident reporting, as dictated by company policy and Risk Management shall be followed. Additional information must meet the following reporting requirements:
 1. The diving officer and the Board shall record and report occupational injuries and illnesses in accordance with all policies and procedures established by company policy and Risk Management.

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2. The diving officer and the Board shall record the occurrence of any diving-related injury or illness which requires any dive team member to be hospitalized for 24 hours or more or after an episode of unconsciousness related to diving activity, or after accident. The report will specify the circumstances of the incident and the extent of any injuries or illnesses.

5.6 EMERGENCY PROCEDURES

5.6.1 During Accidents Requiring Medical Assistance

- A. The following procedures need to be completed in the event of an emergency:
 1. Call the emergency number for the park and advise of the type of emergency.
 2. Render first aid as trained (CPR, Water Extrication, etc.)
 3. Retain all equipment from diver and leave in condition found. Secure equipment and advise Dive Officer of situation.

5.7 STANDARD OPERATING PROCEDURES

5.7.1 Unusual Tasks/Circumstances

- A. Any dive tasks or circumstances not covered by the details in this manual must have a separate Standard Operating Procedure approved by the Dive Control Board and Risk Management. These Standard Operating Procedures must accompany the Dive Safety Manual on file.

APPENDIX I

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DEFINITION OF TERMS (29 CFR 1910.402)

- Bounce Dive:** A dive of relatively short duration. Generally less than 10 minutes.
- Bottom Time:** The total elapsed time measured in minutes from the time when the diver leaves the surface in descent to the time that the diver begins a direct ascent to the surface.
- Breath-hold Diving:** A diving mode in which the diver uses no self-contained or surface-supplied air or oxygen supply.
- Buddy Breathing:** The sharing of a single air source between divers.
- Buddy Diver:** Second member of the dive team.
- Buoyant Ascent:** An ascent made using some form of positive buoyancy.
- Burst Pressure:** The pressure at which a pressure containment device would fail structurally.
- Certified Diver:** A diver who holds a recognized valid certificate from a member organization or recognized certifying agency
- Controlled Ascent:** Any one of several kinds of ascents including normal, swimming, and buddy breathing ascents where the diver(s) maintain control so a pause or stop can be made during the ascent
- Cylinder:** A pressure vessel for the storage of gases.
- Decompression Chamber:** A pressure vessel for human occupancy. Also called a hyperbaric chamber recompression chamber
- Decompression Sickness:** A condition with a variety of symptoms which may result from gas and bubbles in the tissues of divers after pressure reduction.
- Decompression Table:** A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures. (Also called dive tables)

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Dive: A descent into the water, an underwater diving activity utilizing compressed gas, an ascent, and return to the surface.

Dive Location: A surface or vessel from which a diving operation is conducted.

Breathing Gas: A supply system of air or mixed gas (as appropriate) at the dive location which is independent to the primary supply system and sufficient to support divers during any planned decompression dive.

Dive Site: The physical location of a diver during a dive.

Dive Team: Divers and support individuals who are exposed to or control the exposure of others to hyperbaric conditions.

Diver: An individual in the water who uses apparatus, including snorkels, which supplies breathing gas at ambient pressure.

Diver-in-Training: An individual gaining experience and training in additional diving activities under the supervision of a dive team member experienced in those activities.

Diver-carried Reserve

Breathing Gas: A diver-carried independent supply of air or mixed gas (as appropriate) sufficient under standard operating conditions to allow the diver to reach the surface, or another source of breathing gas, or to be reached by another diver.

Diving Mode: A type of diving requiring specific equipment, procedures, and techniques, for example, snorkel, scuba, surface-supplied air, or mixed gas.

Diving Control Board: The group of individuals responsible for the safe conduct of the diving program of the membership organization (see Section 1.60).

FSW: Feet of seawater, or equivalent static head.

Hookah Diving: A type of shallow water surface-supplied diving where there is no voice communication with the surface.

Hyperbaric Chamber: See decompression chamber.

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Hyperbaric Conditions: Pressure conditions in excess of normal atmospheric pressure at the dive locations.

Lead Diver: The certified diver with experience and training to conduct the diving operation.

Maximum Working

Pressure: The maximum pressure to which a pressure vessel may be exposed under standard operating conditions.

Member Organization: An organization which is a current member of the AAUS and which has a program which adheres to the standards of the AAUS as set forth in the AAUS Standards for Scientific Diving Certification and Operation of Scientific Diving Program.

Mixed-gas Diving: A diving mode in which the diver is supplied in the water with a breathing gas other than air.

MSW: Meters of seawater or equivalent static head.

No-Decompression

Limits: The depth-time limits of the “no-decompression limits and repetitive dive group designations table for no-decompression air dives” of the U.S. Navy Diving Manual or equivalent limits.

Normal Ascent: An ascent made with an adequate air supply at a rate of 60 feet per minute or less.

Pressure-related Injury: Any injury resulting from pressure disequilibrium within the body as the result of hyperbaric exposure. Examples include decompression sickness, pneumothorax, mediastinal emphysema, air embolism, subcutaneous emphysema, or ruptured eardrum.

Pressure Vessel: See Cylinder.

Psig: Pounds per square inch gauge.

Recompression Chamber: See decompression chamber.

Scuba Diving: A diving mode independent of surface supply in which the diver uses open

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circuit self-contained underwater breathing apparatus.

Standby Diver: A diver at the dive location capable of rendering immediate assistance to a diver in the water.

Surface Supplied Diver: A diving mode in which the diver in the water is supplied from the dive location with compressed gas for breathing.

Swimming Ascent: An ascent which can be done under normal or emergency conditions accomplished by simply swimming to the surface.

Umbilical: The composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communications, power, or heat, as appropriate to the diver mode or conditions, and includes a safety line between the diver and the dive location.

Volume Tank: A pressure vessel connected to the outlet of a compressor and used as an air reservoir.

Working Pressure: The normal pressure at which the system is designed to operate

APPENDIX II

LINE PULL SIGNALS

FROM TENDER TO DIVER		FROM DIVER TO TENDER	
1 Pull	"Are you all right?" When diver is descending, one pull means "stop"	1 Pull	"I am all right". When descending, one pull means "stop" or "I am on the bottom"
2 Pulls	"Going Down" During ascent, 2 pulls mean "you have come up too far" go	2 Pulls	"Lower" or "Give me slack"

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	back down until we stop you"		
3 Pulls	"Stand by to come up"	3 Pulls	"Take up my slack"
4 Pulls	"Come up"	4 Pulls	"Haul me up"
EMERGENCY SIGNALS FROM THE DIVER			
2-2-2 Pulls	"I am fouled and need the assistance of another diver		
3-3-3 Pulls	"I am fouled but can clear myself"		
4-4-4 Pulls	"Haul me up immediately"		